Administering QuickTime Streaming Server

Session 719

Administering QuickTime Streaming Server

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Administering QuickTime Streaming Server

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Server Engineering

What We'll Cover Today

- New QTSS Admin GUI
- New content management tools
- Advanced administration

New QTSS Admin GUI

- Native Mac OS X application
- Integrated with Mac OS X Server Admin
- Web-based U/I still exists

Demo

John Anderson

New Content Management Tools

- QTSS Publisher
  - Remote media file management
  - Automatic hinting and web preparation of media
  - Create QuickTime web galleries
  - Streaming play list management
  - Annotation Editing
  - Scripting tools

Demo

John Anderson

Advanced Administration

- Firewalls
- Working via the command line
- Troubleshooting
- “Hidden” configuration options

Firewalls/NATs and Proxies

The Protocols

RTSP Control Connection (TCP)

Server ports 554, 7070, 80

DESCRIBE request → SETUP request → SETUP request → PLAY request

DESCRIBE reply (SDP) ← SETUP reply ← SETUP reply ← PLAY reply

RTP/RTCP

Client ports 6970 and up (UDP)

QT Player

QTS Server

Media Track #1

Status

Media Track #2

Status

RTCP (UDP)

Status

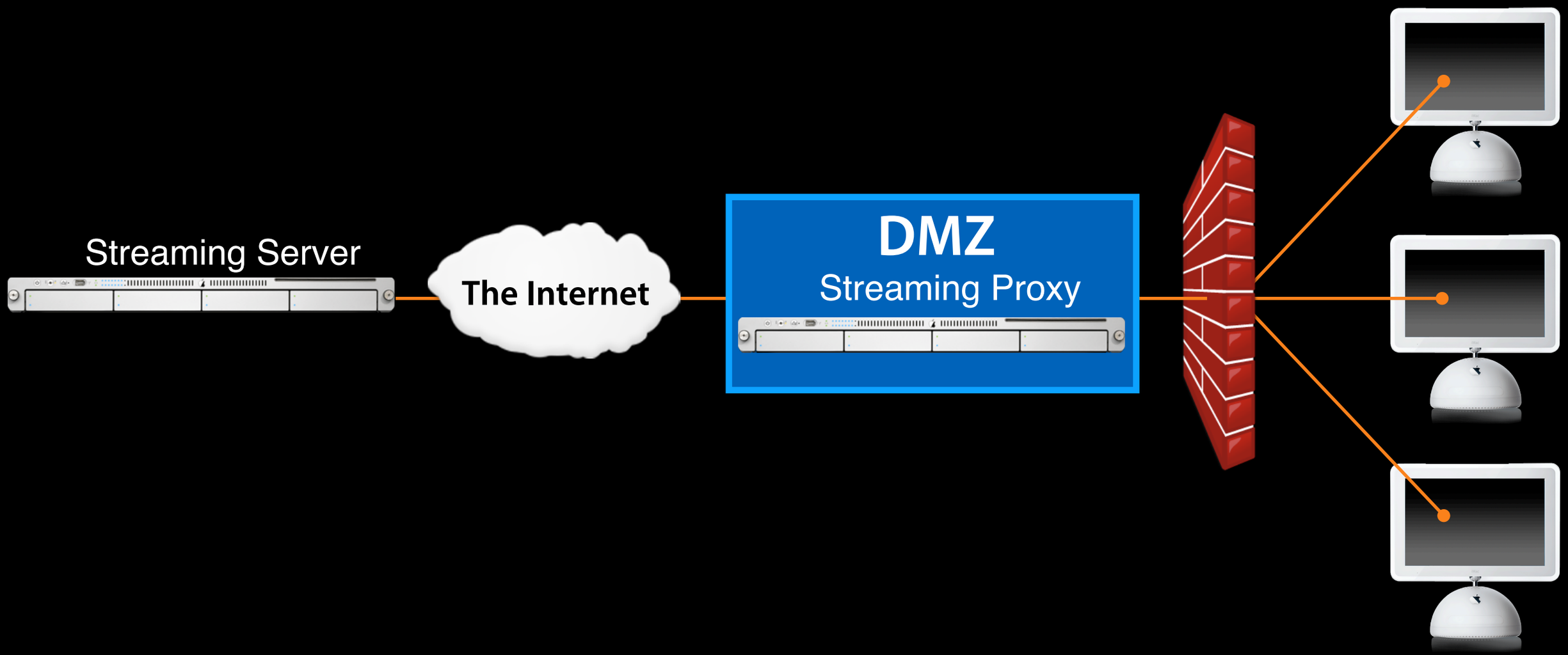
Firewalls/NATs and Proxies

Problematic Protocols

- RTP/RTCP are sent out of band from RTSP
  - Firewalls consider these packets to be unsolicited
  - NATs have no idea what to do with this
- Proxies typically live in the DMZ on the client side
  - They understand RTSP/RTP/RTCP
  - Servers see proxies as just another client
  - Clients see proxies as just another server
  - Proxies translate between server and client

Streaming Proxy

A typical configuration



QuickTimeStreamingServer

Command line options

```
root% QuickTimeStreamingServer -v
 QTSS/4.0 [v410]-MacOSX Built on: Jan 22 2002, 15:57:27
 usage: QTSS [ -d | -p port | -v | -c /myconfigpath.xml | -o /
 myconfigpath.conf | -x | -S numseconds | -I | -h ]
 -d: Run in the foreground
 -p XXX: Specify the default RTSP listening port of the server
 -c /myconfigpath.xml: Specify a config file
 -o /myconfigpath.conf: Specify a DSS 1.x / 2.x config file to
build XML file from
 -x: Force create new .xml config file from 1.x / 2.x config
 -S n: Display server stats in the console every "n" seconds
 -I: Start the server in the idle state
 -h: Prints usage
```

streamingserver.xml

- The main configuration file for the streaming server
- XML-based
- Very modular
- “streamingserver.xml-sample” is fully commented
- Over 140 attributes
- Server rereads preferences in response to a HUP signal
- Delete streamingserver.xml, then rerun server to regenerate a config file containing proper default value

Example Attributes

```
<!-- if this is true, the server will automatically restart itself if it crashes. -->
        <PREF NAME="auto_restart" TYPE="Bool16">true</PREF>


<!-- Path to the root folder for movies. -->
        <PREF NAME="movie_folder">/Library/QuickTimeStreaming/Movies</PREF>


<!-- Enables debugging of the RTSP protocol (used for developer debugging) -->
    <PREF NAME="RTSP_debug_printfs" TYPE="Bool16">false</PREF>


<!-- RTP packet debugging options (used for developer debugging) -->
    <PREF NAME="enable_packet_header_printfs" TYPE="Bool16" >false</PREF>
    <PREF NAME="packet_header_printf_options" >rtp;rr;sr;app;ack;</PREF>
```

A Few of the Interesting Attributes

```
<SERVER>
    max_send_ahead_time         max size to grow client buffer
    run_group_name              group server should run as
    run_user_name               user server should run as
    error_logfile_verbosity     0=just errors, 3=everything
    RTSP_debug_printfs          sends RTSP traffic to terminal
    bind_ip_addr                list of IP addresses server should use

<MODULE NAME="QTSSFileModule" >
    add_seconds_to_client_buffer_delay add 'n' seconds to normal buffer delay
    enable_movie_file_sdp       override movie's built in SDP info
    record_movie_file_sdp       spit out an sdp when movie is played

<MODULE NAME="QTSSAccessLogModule" >
    request_logtime_in_gmt      gmt or local time in logs?

<MODULE NAME="QTSSAdminModule" >
    LocalAccessOnly             only allow local admin server requests
    IPAccessList                remote admin server ip filter

<MODULE NAME="QTSSMP3StreamingModule" >
    mp3_max_flow_control_time   server-side mp3 buffer
```

Changing Broadcast Behavior

```
<!-- When a broadcaster RTSP session goes down also teardown the clients watching the stream -->
        <PREF NAME="kill_clients_when_broadcast_stops" TYPE="Bool16">false</PREF>


<!-- Turn on or off a broadcaster Announce of an SDP file to the server -->
    <PREF NAME="enable_broadcast_announce" TYPE="Bool16">true</PREF>

<!-- Turns on or off accepting setups on an existing broadcast stream -->
    <PREF NAME="allow_duplicate_broadcasts" TYPE="Bool16">false</PREF>
```

Dealing With Firewalls

```
<!-- Port(s) for accepting client connections -->
<!-- NOTE: Add port 80 to the list of "rtsp_port"'s -->
<!-- if you are streaming across the internet -->
<!-- and want clients behind firewalls to be -->
<!-- able to connect to the streaming server -->
        <LIST-PREF NAME="rtsp_port" TYPE="UInt16">
                <VALUE>7070</VALUE>
                <VALUE>554</VALUE>
                <VALUE>8000</VALUE>
                <VALUE>8001</VALUE>
        </LIST-PREF>

<!-- when behind a round robin DNS, the client needs to be told the specific -->
<!-- ip address of the matching handling its request. this pref tells the server -->
<!-- to report its IP address in the reply to the HTTP GET request when -->
<!-- tunneling RTSP through HTTP. -->
<PREF NAME="do_report_http_connection_ip_address" TYPE="Bool16">disabled</PREF>


<!-- This tells the server what IP address it should accept -->
<!-- client connections on. A value of 0 means all IP addresses currently -->
<!-- enabled for the machine. -->
<PREF NAME="bind_ip_addr">0</PREF>
```

MP3 Streaming

At the command line

```
root% MP3Broadcaster -v
 MP3Broadcaster/4.0 [v410] Built on: Jan 22 2002, 16:00:05
 usage: MP3Broadcaster [-v] [-d] [-x] [-X] [-a ipAddress] [-p portNum] [-l
 filename] [-w filename] [-e filename] -c filename
        -v: display version
        -d: run in foreground
        -x: preflight configuration
        -X: check MP3 files
        -a <ipaddr>: broadcast to this address (default = local loopback)
        -p <port>: broadcast to this port (default = 8000)
        -c <path>: path to config file
        -l <path>: path to playlist (overrides config file)
        -w <path>: path to dir to create temp lists (overrides config file)
        -e <path>: print output to error file
```

MP3 Streaming
Configuration files

- Play lists always require two “config” files
  - Config file
  - Play list file
- Optional meta files
  - <playlistname>.replacelist
  - <playlistname>.stoplist
  - <playlistname>.current
  - < playlistname>.upcoming

MP3 Streaming

The config file

```
playlist_file /Playlists/Demo/Demo.playlist
play_mode sequential
destination_ip_address 127.0.0.1
destination_base_port 554
broadcast_mount_point "/wwdc"
broadcast_name "WWDC Demo"
broadcast_sample_rate -1
broadcast_genre Pop
working_dir "/Playlists/Demo/Demo"
broadcast_password "apple"
pid_file "/Playlists/Demo/Demo.pid”


max_upcoming_list_size  4     # for .upcoming file
recent_songs_list_size  4     # repeat control
show_current enabled          # for .current file
show_upcoming  enabled        # for .upcoming
broadcast_bitrate  64000      # desired bit rate for pre-flighting
```

MP3 Streaming

The play list file

```
*PLAY-LIST*
#
# Created by QTSS Admin CGI Server
#
"/Music/Sade/Lovers Rock" 5
"/Music/The Cars/Anthology/Dangerous Type.mp3" 5
"/Music/The Cars/Anthology/Good Times Roll.mp3" 5
"/Music/The Cars/Anthology/Just What I Needed.mp3" 5
"/Music/The Cars/Anthology/Candy-O.mp3" 5
"/Music/The Cars/Anthology/Moving In Stereo.mp3" 5
```

MP3 Streaming

Optional meta files

- <playlistname>.replacelist
  - Replaces the current play list. Transition happens after currently playing file completes (same format as play list file)
- <playlistname>.stoplist
  - Gracefully stops the play list after completely playing each of the files in the stop list (same format as play list file)
- <playlistname>.current
  - Contains the name of the currently playing file
- <playlistname>.upcoming
  - Contains the names of the next scheduled `max_upcoming_list_size` files
- Also works with movie play lists

MP3 Streaming

Transcoding/Live encoding

- Transcoding
  - MacAmp, RadioDestiny, WinAmp, and more are compatible with QTSS
- Live Encoding
  - Lame and LiveIce

StreamingLoadTool

- RTSP/RTP client simulator
- Performance testing
- Stress testing
- Protocol testing
- Works with both servers and proxies

StreamingLoadTool

Command line options

```
root% StreamingLoadTool -v
```

```
StreamingLoadTool 4.0 [v410], built on Jan 22 2002, 16:02:43.
Usage: StreamingLoadTool [-f path] [-c #]
-f: Config file to use. Defaults to streamingloadtool.conf
-c: HTTP cookie to use. Overrides what is in config file
```

StreamingLoadTool

streamingloadtool.conf

- Text File Format
  - See /Library/QuickTimeStreaming/Config/streamingloadtool.conf
- Some Interesting Settings

```
clienttype              (udp, reliableudp, http, tcp)
concurrentclients       (how many will “watch” at a time)
movielength             (how long to “watch”)
runforever              (yes/no)
logpath                 (filepath)
url                     (list of rtsp urls)
```

StreamingLoadTool

Running the tool

- [clecroy2:/Library/QuickTimeStreaming/Config] chris% StreamingLoadTool streamingloadtool.conf

```
Checking for 'streamingloadtool.mov' on the target servers
Done checking for 'streamingloadtool.mov' on all servers
StreamingLoadTool test in progress.
Config file: streamingloadtool.conf. Client type: RTSP/ReliableUDP client. Num clients: 3.
Movie length: 40. Run forever: 0. HTTP cookie: 1000003. Port: 554
Writing StreamingLoadTool log at: streamingloadtool.log
Active Playing Attempts Success Errors Failed
     3       0        3       0      0       0
     3       2        3       0      0       0
     3       2        3       0      0       0
     3       2        3       0      0       0
     3       2        3       0      0       0
     3       2        3       0      0       0
StreamingLoadTool test complete. Total number of connections: 3.
```

StreamingLoadTool

The log file

```
Client complete. IP addr = 17.221.42.252, URL = rtsp://clecroy2.apple.com/
sample_300kbit.mov. Connection status: Completed normally.
Track type: Sound. Total packets received: 176. Total packets lost: 0. Total
out of order packets: 0. Total duplicate packets: 1. Total ACKs sent: 166.
Track type: Video. Total packets received: 3102. Total packets lost: 1. Total
out of order packets: 2. Total duplicate packets: 22. Total ACKs sent: 743.
Play duration in sec: 40. Total stream bit rate in Kbits / sec: 483.150787.

Client complete. IP addr = 17.221.42.252, URL = rtsp://clecroy2.apple.com/
Digimax_CF1.mp4. Connection status: Couldn't connect to server.

Client complete. IP addr = 17.221.42.252, URL = rtsp://clecroy2.apple.com/
sample_100kbit.mp4. Connection status: Completed normally.
Track type: Video. Total packets received: 1070. Total packets lost: 0. Total
out of order packets: 0. Total duplicate packets: 3. Total ACKs sent: 632.
Track type: Sound. Total packets received: 700. Total packets lost: 0. Total
out of order packets: 0. Total duplicate packets: 1. Total ACKs sent: 596.
Play duration in sec: 40. Total stream bit rate in Kbits / sec: 154.753128.
```

qtmedia

New in Panther Server

```
root% qtmedia
qtmedia 1.0 (7)
Usage: qtmedia [-x] [-l [language code] ] [-d] [-r [id] ] [-a
[id] [annotation] ]  [-f | -h [filenames] ]
Help:   Shows info on one or more movies.
        Ref movies will return an error if the server or
referenced file is unavailable.
String rules: Place "" around strings with white space. %[hex]
and #[dec] ascii chars are allowed. Use %% or ## for a single %
or #.
Options:
        -l Set annotation language code.
        -f Fast-start the specified files for download.
        -h Hint the specified files for streaming.
        -x Display the results in XML-PList format.
        -a Add a © tagged annotation string with a 3 char id.
        -r Remove a © tagged annotation string using a 3 char id.
        -d Report debugging errors.
```

qtref

New in Panther Server

```
root% qtref
qtref 1.0 (7)
Usage: qtref  [-x] [-d] [-r | -t  [destination file] [url] ] | [-
a [destination file] [[bit rate] [url] repeats ... ] ]
Help: Create a ref movie for one or more URLs
String rules: Place "" around strings with white space. %[hex]
and #[dec] ascii chars are allowed. Use %% or ## for a single %
or #.
Options:
        -r Create QuickTime Atom ref movie with extension .qtl
[new ref file path and url].
        -t Create XML text ref movie with extension .qtl [new
link file path and url].
        -a Create alternate data rate movie with extension .qtl
[ new data ref file path and pairs of rate and url].
        -d Print debug error and info messages.
        -x Display the results in XML-PList format.
        -e Don't add .qtl to file name.
```

Advanced Administration

Troubleshooting Modes

- Turn on the debugging options in streamingserver.xml

```
<PREF NAME="RTSP_debug_printfs" TYPE="Bool16">true</PREF>
<PREF NAME="enable_packet_header_printfs" TYPE="Bool16" >true</PREF>
<PREF NAME="packet_header_printf_options" >rtp;rr;sr;app;ack;</PREF>
```

- Launch from the terminal in “debug” mode

```
root% QuickTimeStreamingServer -d
```

- Connect a client

Troubleshooting:
Deciphering the output

RTSP Request: DESCRIBE

```
#C->S:
#time: ms=13496 date=Tue, 27 May 2003 20:00:57 GMT
#server: ip=17.221.42.252 port=7070
#client: ip=17.221.42.155 port=49179
DESCRIBE rtsp://clecroy2.apple.com/sample_300kbit.mp4 RTSP/1.0\r\n
CSeq: 1\r\n
Accept: application/sdp\r\n
Bandwidth: 2147483647\r\n
Accept-Language: en-US\r\n
User-Agent: QTS (qtver=6.5d14e1;cpu=PPC;os=Mac 10.2.6)\r\n
\r\n
```

Troubleshooting:

Deciphering the output

RTSP Response: DESCRIBE

```
#S->C:
#time: ms=13556 date=Tue, 27 May 2003 20:00:57 GMT
RTSP/1.0 200 OK\r\n
Server: QTSS/4.2.0.x (Build/432; Platform/MacOSX; Release/Development; )\r\n
Cseq: 1\r\n
Last-Modified: Thu, 15 May 2003 02:06:18 GMT\r\n
Cache-Control: must-revalidate\r\n
Content-length: 1057\r\n
Date: Tue, 27 May 2003 20:00:57 GMT\r\n
Expires: Tue, 27 May 2003 20:00:57 GMT\r\n
Content-Type: application/sdp\r\n
x-Accept-Retransmit: our-retransmit\r\n
x-Accept-Dynamic-Rate: 1\r\n
Content-Base: rtsp://clecroy2.apple.com/sample_300kbit.mp4/\r\n
\r\n
v=0\r\n
o=StreamingServer 3263054457 1052964378000 IN IP4 17.221.42.252\r\n
s=/sample_300kbit.mp4\r\n
u=http:///\r\n
e=admin@\r\n
c=IN IP4 0.0.0.0\r\n
b=AS:311\r\n
t=0 0\r\n
a=control:*\r\n
a=mpeg4-iod:"data:application/mpeg4-iod; base64,AoF/

ETC...
```

Troubleshooting:
Deciphering the output

RTSP Request: SETUP

```
#C->S:
#time: ms=13633 date=Tue, 27 May 2003 20:00:57 GMT
#server: ip=17.221.42.252 port=7070
#client: ip=17.221.42.155 port=49179
SETUP rtsp://clecroy2.apple.com/sample_300kbit.mp4/trackID=3 RTSP/1.0\r\n
CSeq: 2\r\n
Transport: RTP/AVP;unicast;client_port=6974-6975\r\n
x-retransmit: our-retransmit\r\n
x-dynamic-rate: 1\r\n
x-transport-options: late-tolerance=0.150000\r\n
User-Agent: QTS (qtver=6.5d14e1;cpu=PPC;os=Mac 10.2.6)\r\n
Accept-Language: en-US\r\n
\r\n
```

RTSP Response: SETUP

```
#S->C:
#time: ms=13646 date=Tue, 27 May 2003 20:00:57 GMT
OPTIONS * RTSP/1.0\r\n
Content-Type: application/x-random-data\r\n
Content-Length: 1400\r\n
\r\n
```

Troubleshooting:
Deciphering the output

RTCP Packets (status)

>recv sess=1: RTCP APP recv_sec=37.658 type=video size=68 H_vers=2, H_pad=0, H_rprt_count=0, H_type=204, H_length=16, H_ssrc=1467798562
H_app_packet_name = QTSS, H_src_ID = 1421604135, H_vers=0, H_packt_len=12
H_type=rr(, H_size=4, rcvr_bit_rate=16792),
H_type=dl(, H_size=2, avg_buf_delay=2),
H_type=pr(, H_size=4, pckts_rcvd=2918),
H_type=pd(, H_size=2, pckts_drppd=0),
H_type=fr(, H_size=2, frame_rate=7635),
H_type=xr(, H_size=2, xpectd_frame_rate=7635),
H_type=ob(, H_size=4, ovr_buffr_windw_siz=4294967295),

Troubleshooting:
Deciphering the output

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H_app_packet_name = QTSS, H_src_ID = 1421604135, H_vers=0, H_packt_len=12
H_type=rr(, H_size=4, rcvr_bit_rate=16792),
H_type=dl(, H_size=2, avg_buf_delay=2),
H_type=pr(, H_size=4, pckts_rcvd=2918),
H_type=pd(, H_size=2, pckts_drppd=0),
H_type=fr(, H_size=2, frame_rate=7635),
H_type=xr(, H_size=2, xpectd_frame_rate=7635),
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H_type=pr(, H_size=4, pckts_rcvd=2918),
H_type=pd(, H_size=2, pckts_drppd=0),
H_type=fr(, H_size=2, frame_rate=7635),
H_type=xr(, H_size=2, xpectd_frame_rate=7635),
H_type=ob(, H_size=4, ovr_buffr_windw_siz=4294967295),

Admin Protocol

- HTTP-based
- Easy to write additional tools
- Web admin uses it
- Use a web browser or curl to look under the hood
- Use TCP port 554

Admin Protocol

As a troubleshooting tool

- http://user:password@hostname:554/attributePath
- Example

```
http://admin:secret@127.0.0.1:554/modules/admin/server/movie_folder
```

Using Curl as a Troubleshooting Tool

```
root% curl "http://admin:apple@127.0.0.1:554/modules/admin/
server/*"

root% curl "http://admin:apple@127.0.0.1:554/modules/admin/
server/qtssSvrClientSessions/*"

root% curl "http://admin:apple@127.0.0.1:554/modules/admin/
server/qtssSvrClientSessions/3/*"

root% curl "http://admin:apple@127.0.0.1:554/modules/admin/
server/qtssSvrClientSessions/3/qtssCliSesCurrentBitRate"
```

For More Information

Roadmap—Wednesday

	Russian Hill	Pacific Heights	Haight/ Ashbury	SOMA
9:00	711 Audio and QuickTime		712 QuickTime for the Web	713 Introduction to QuickTime Interactivity
10:30			714 Large-Scale Webcasting: Macworld Keynote Case Study	715 QuickTime Interactivity Tools
12:00				
2:00	716 Advanced QuickTime Programming Techniques		717 3GP: Myth Versus Reality	718 AppleScript and QuickTime
3:30			719 Administering QuickTime Streaming Server	720 Content Creation for Mobile Phones: Top 10 Success Factors
5:00			721 WiFi and 3G: Let the Games Begin	722 Advanced QuickTime Interactivity

Roadmap—Thursday

	The Mission	Haight/ Ashbury	SOMA
9:00		723 The Real Story About MPEG-4 Visual Licensing	724 What's New With QuickTime VR?
10:30		725 QuickTime and Enhanced CDs	726 Cutting-Edge Projects Using QuickTime VR
12:00			
2:00	727 QuickTime Streaming Server Programming	728 Produce a Listening Party With QuickTime	729 Industrial-Strength Encoding
3:30		FF011 QuickTime Feedback Forum	
5:00			

Roadmap—Friday

	Pacific Heights	The Marina
9:00		
10:30	730 QuickTime Alternative Programming Environments	
12:00		
2:00		731 Internet Application Development: The New Frontier
3:30		
5:00		

Who to Contact

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QuickTime Technology Manager
quicktimeman@apple.com

http://developer.apple.com/wwdc2003/urls.html

For More Information

Documentation

General Information

http://www.apple.com/quicktime

Developer Information

http://developer.apple.com/documentation

QuickTime Information

http://developer.apple.com/QuickTime

Do Not Miss!

Lab: QuickTime Content Creation

Meet with QuickTime content experts for daily content specific topics that are of special interest to you. Bring your own media and Powerbook. No appointment is needed—first-come, first-served.

Sacramento Room

Lab: QuickTime Development

Meet with Apple's QuickTime engineers. Each day will emphasize a specific QuickTime development topic. Bring your own code and Powerbook. No appointment is needed—first-come, first-served.

Sacramento Room

Lab Hours

Monday	12:00pm to 6:00pm
Tuesday	9:00am to 6:00pm
Wednesday	9:00am to 6:00pm
Thursday	9:00am to 4:30pm
Friday	9:00am to 6:00pm

Q&A

Stephen Tonna
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stonna@apple.com

http://developer.apple.com/wwdc2003/urls.html

WWDC 2003

Worldwide Developers Conference